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CSCI 3104, Algorithms **Profs. Grochow & Layer**
Explain-It-Back 7 **Spring 2019, CU-Boulder**

Explain dynamic programming to a biology major—what it is, how it works, and why it is valuable.

First of all, every program is measured by its time complexity, basically some unit of time, based on the size of the input into the code, that it takes to execute. The dynamic programming approach to a problem is basically a method of breaking the problem down into a set of sub problems which call each other in the body of the program. Eventually, the problem is solved by solving all of the sub problems. So, the problem is divided into a set of sub problems and we begin to look for the most likely, or optimal, solution of the sub problems in order to solve the problem. Each sub problem works together in order to combine their solutions and use all of those solutions to solve to main problem. This technique of dynamic programming is valuable because it helps to resolve complex problems effectively and easily which may take exponential time to resolve in other approaches. Dynamic programming is reusable since the smaller sub problem solution is memoized, or stored/cached, for future reference to solve the main problem. This drastically reduces complexity, memory usage, and computation time which is very important in an algorithm, making dynamic programming a very valuable and useful tool.

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